Birth Rates Determine Life Expectancy in Theoretical Equilibrium Populations: Implications for Political Demography and Conflict Early Warning

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Executive Summary

This paper examines implications for political demography of a theoretical population that is in complete equilibrium. By "complete equilibrium," we mean that the population neither grows nor shrinks, there is neither immigration to nor emigration from it, and that the age structure has stabilized so that it no longer changes over time. These are all important elements of complete equilibrium, as opposed to stability in just absolute numbers. This condition is found in some natural populations of animals and plants, but it has not obtained in most human populations in recorded history. Reduced to basics, this theoretical population has the following characteristics:

1. In complete equilibrium populations, birth rates will equal death rates so the population neither grows nor shrinks.

2. In a complete equilibrium population, death rates determine life expectancy, expressible as: LE = 1000/DR.

3. Since, in a complete equilibrium population, birth rates equal death rates, this can also be expressed as: LE = 1000/BR.

4. This implies that fundamentally, birth rates determine life expectancy in complete equilibrium populations.

This paper has two goals. The first is simply to check the accuracy of the theoretical formulas identified above. Since they are quite simple and likely accurate, I invite others to identify any errors. The second goal is at least as important. How do human populations evade this limiting outcome? Or do they really? I fear the short answer to these questions is a) genocide and war, and b) no, they do not really escape an iron law of biology. However, they often do displace the high death rates to marginal or weaker populations. If correct, this has significant implications for conflict early warning as illustrated by several real-world examples.

Introduction

The United States military is getting tired of fighting perpetual wars in areas where decisive victory appears near impossible. [1],[2] This is not their fault, and finding fault is never our purpose here. Political leaders send troops into these impossible war zones. They generally do so with the best of intentions also, to stop genocides for one example, or to hold back the tide of terrorism that flows from "failed states." However, both politicians and military practitioners often fail to recognize the power of one of the most important ultimate causes of wars and genocides. That is high birth rates, which in the long run appear to require high death rates somewhere, somehow.

That tragic consequence of high birth rates is often obscured by ubiquitous political and religious language that offers other explanations for why people fight on large scales. This consequence is also obscured by common demographic phenomena like migrations and age distribution effects.

Finding or assigning blame is categorically not the purpose of this paper. Fixing the problem of perpetual and unwinnable wars is. Thermonuclear war is a predictable outcome of a system of perpetual conventional wars. So avoiding that is another goal. Genocide is also common where perpetual wars prevail. The living system that supports us all is damaged by such phenomena. Therefore, avoiding preventable genocides, nuclear war, perpetual conventional wars and restraining the ongoing destruction of the living system are the purposes of this paper.

Wars are almost always blamed on some "other" who is "evil" in some way. "In" groups are good, and "Out" groups are considered at least suspicious and often dangerous. Such is human nature, and tribal politics. Some religious leaders and many politicians have made careers out of identifying threats to their peoples and power structures in this way for millennia. [3]

Stripping away the confusion caused by political and religious theories of conflict can help to reveal the power of more fundamental factors like demography. Therefore, we will first examine how human populations can sidestep the theory of complete equilibrium populations expressed by the simple, arithmetic syllogism identified in the abstract. They grow (temporarily), find "new" territories (often displacing or eliminating other humans already there), or use technology to expand carrying capacities. Then we will look at some historic examples. Then we will reexamine how high birth rates may contribute to rising authoritarian politics, militant (or militarized) religions, corruptions of governance, and other, more familiar explanations for organized armed conflicts. Cincotta et al's theory of age structural transitions is a much more sophisticated window on that process. [4]

How Human Populations have Sidestepped this "Iron Law" of Biology … so far

Technology can increase the carrying capacity of any human ecosystem, and humans have been working on that for millennia. [5] Yet limits loom and people still starve despite such progress. Another simple way to avoid high birth rates generating low life expectancies is for a population to grow. Humankind certainly has grown through most of recorded history. But nothing grows forever; believe us, this is a biological truism, and ongoing damage to the entire living system of the earth bears witness to the end of that method for maintaining high human life expectancies.

Too commonly stronger groups wipe out weaker groups, to grow at their expense. History is replete with examples of that, from the Romans to Genghis Khan's Mongols, to the European conquest of the Americas. I will exemplify this with a case where precise numbers are easier to obtain involving the land where I now live, the affluent state of Minnesota, USA. Just over 200 years ago, in 1800 CE, this land was almost 100% Native Americans mainly of the Dakota and Ojibwe tribes, with <1% French Canadian fur trappers and traders scattered about. By 1900 CE, just one century later, Native Americans were only .52 % (half of one percent) of the official census. [6] By 1980, even the memory of Native American origins and history was almost gone except for a plethora of Indian place names. [7]

Vast numbers of immigrants from Europe and the east had simply overwhelmed the Indians. [8] The result: While in 1800, the territory now called Minnesota was 99%+ Indian, in just 100 years two indigenous peoples had been almost totally replaced by immigrants from far away.

For decades, some scholars objected to using the term "genocide" in this context, contending that most Native Americans actually died of diseases rather than violence. Many certainly did die that way, but this ignores obvious consequences of being banished into barren (and often frozen) lands with neither game nor much in the way of natural foods. Some scholars even objected to the use of the term "war" because less than 1,000 had died within one year in "organized, armed conflict between states." [9] Such technical counting rules have a place in political science, but they also provided an easy way to ignore or forget what actually happened. Millions of European immigrants were pouring into eastern American states, where many were told to "Go West, young man" where land was "free" and "Manifest Destiny" ruled. Indians were often considered mere dangerous pests, and thousands were killed in a great many ways other than formal "wars" between nation states. I know this for certain because my own ancestors were involved.

Japan and Germany in World War II

After World War II, the dominant explanation for Japan's entry into that war was population pressure, and this remains the main view in Japan to this day. Japan was experiencing one million new mouths to feed each year on an island nation. [10] It faced constraints on industrial development and imminent starvation among the poor. Debate in Japan's Diet (Parliament or Congress equivalent) was explicit about the need to obtain new resources, especially oil and rubber but also timber and food, before catastrophe struck. An explicitly colonial policy to take resources from China and Southeast Asia included an invasion of "Manchukuo" formerly called Manchuria. China was invaded in 1931, and one conquest led to many others until the disastrous decision to attack Pearl Harbor on December 7, 1941. Much discussion focuses on the rise of "militarists" in the Japanese government, which is certainly appropriate and true. What it tends to overlook is *why* the militarists rose and were persuasive to the larger Japanese society.

In Germany, the operative term was "*Lebensraum*" or "living room," which is often forgotten in erudite discussions of fascism as a political ideology or Hitler's exceptional anti-Semitism, and subsequent slaughter of Jews, Gypsies and so many other victims of his genocidal state. [11] Those all have their place, but my point here is to highlight the tidal power of an ultimate cause [12] called population pressure. The US Holocaust Memorial Museum notes this:

> Long before the Nazi period, many Germans looked to Eastern Europe as the natural source of their *Lebensraum.* Beginning in the Middle Ages, the social and economic pressures of over-population in the German states had led to a steady colonization of Germanic peoples in eastern Europe. Increasingly by the twentieth century, however, scholars and the public alike began to view the East as a region whose vast natural resources were wasted on racially "inferior" peoples like Slavs and Jews."

Racism and ideology indicate "acceptable" targets to those who feel constrained, and angry about that. Why did Hitler make his disastrous decision to invade Russia? His own comments on why the "pure" Aryan people deserved more "living room" should give us some indication.

Huge wars involving many major nation states often have multiple causes, and some are much easier to discuss than the prickly cactus of population and demographic issues. So let us look briefly at some smaller cases where conditions are simpler and verifiable numbers easier to see.

The Examples of Easter Island and El Salvador

Easter Island lies in the South Pacific, west of Chile but far from the island clusters farther west and north. We know it from records of Captains Roggeveen, 1722, Gonzales, 1770, and Cook, 1774, and from Thor Heyerdahl and Jacques Cousteau of the modern period. Cousteau supported some formal archeology on the island, as have others. The most pertinent verifiable facts about Easter Island follow. [13]

When it was rediscovered by Captain Cook in 1774, there were less than 1000 people on the 7 by 13 mile island (11 by 21 kilometers), apparent descendants of a much larger civilization. They scratched out a stoic living on an island where no trees grew, but where 30-foot stone statues were abundantly arrayed, standing erect miles from where the stones were quarried.

For decades the mystery was: Who built the mammoth statues, weighing hundreds of tons each? How did they cut and haul them around the island, and why? Where did they go? Why was the island barren of trees? Thor Heyerdahl showed that colonization of the South Pacific could have been accomplished by people in rafts or great canoes from South America. Others surmised that the island was colonized from Polynesia, but what matters more is not how the island was colonized, but rather, did the statue makers leave, or die?

Cousteau and others added some critical bits to the data. There was wood on the island originally, and the culture that developed there created a unique form of writing, carved onto wood pieces found in numerous caves. Many hundreds of skulls were also found in the caves. Why did they hide in the caves, or were these mere burial grounds of an unusual kind?

From the information they reviewed, Cousteau and island archaeologists reached these conclusions. The island was originally forested and lush, like most Pacific islands. The first immigrants lived by fishing from dugout canoes made from the local trees, supplemented by abundant natural fruits and some agriculture. For a while, for generations, there was room for everyone, wood for everyone, food for all, and a mini-civilization arose. Growing populations develop considerable momentum (due to their pyramidal age structures) and on an island, physical limits are abrupt. Emigration was not an option. Suddenly, there was not enough land for everyone. Family agricultural plots became much more important, probably jealously guarded, and the trees that provided wood for cooking, construction and canoes began to disappear. People killed each other, and clan affiliations became far more important.

There is some evidence that collapse was accompanied by development of a second, bizarre and ritualistic culture characterized by religious-governmental practices including human sacrifice. Certainly archaeology describes a cultural transformation, which some label the Cult of the Bird Men, after an annual event used to choose a leader. An estimated 20,000 people were reduced to under 1,000 before the killing stopped, or at least by the time Captain Cook arrived. Subsequent

disease reduced this number further until it bottomed out at 114 survivors. The island still has almost no trees, and land fit only for pasture.

Civil conflict in El Salvador has been endemic for at least 40 years, and today it has the highest murder rate of any non-warring country on earth. We will present this example very simply, despite huge complications of super power meddling during the Cold War, which affected many Central American countries. Proxy civil wars funded by super power rivalry can easily obscure other underlying forces. I contend that civil conflict in El Salvador during the 1980's was also fueled by a population density greater than India's on land that is 75% mountains. Another way to put this is that El Salvador had a population (~5 million then) greater than Minnesota's, on a land area less than Rhode Island, three quarters of which is not very suitable for farming. [14]

Abject poverty for most, coexisting with conspicuous wealth for oligarchies, energizes conflicts throughout this region. El Salvador's growth rate in 1968 was 2.8% per year, which implies doubling every 25 years, and they had already lost much of their forest. Their 2017 estimated population was 6,172,011, but their growth rate has declined dramatically to .25% per year. The CIA's World Factbook claims that "At least 20% of El Salvador's population now lives abroad" and that cash remittances from those emigrants now contribute at least 20% of their entire GDP.

Syria and Myanmar

One of the most brutal civil wars of the recent period began in Syria in about 2011, although there is no clearly defined starting point. Most can agree that peaceful protests over economic and equity issues were repressed, and slowly became more violent until Prime Minister Bashir al-Assad began bombing his own people. The demographic perspective highlights these two underlying forces.

In 2010, Syria's growth rate was about 2.4%, [15] which implies a doubling time of less than 30 years. [16] The World Bank also observed that at least 1.5 million people (8 % of Syria's pre-war population) had left unproductive rural areas for cities due to 4-5 years of the worst drought in recorded history there. [17] One might speculate about global population pressure as a cause of global warming and severe droughts, but there is zero doubt that such a large number of rural immigrants into cities, which were already overburdened with millions of unemployed youth, presented severe pressures there.

Assad already reserved the best opportunities for his Alawite prime constituency, and for minority allies like Christians. Peaceful protests began in cities over lack of opportunity for the rest, and corruptions. Security institutions over-reacted and repression morphed into civil war(s).

Caught between barrel bombs, chemical attacks, and forced conscription on one side, and ISIS or Al Qaeda on the other side, millions of Syrian people fled into Turkey, Lebanon and Jordan, putting great pressure on those countries also. [18] At least four million stayed in those near neighbor countries, and about one million made it all the way to Europe. Another eight million were internally displaced, and at least one half million died violent deaths from the conflict which still has not ended.

In Myanmar, we have another complex case that mixes history, ethnicity and religion, which are all easier to measure than demographics in very remote areas of rather remote and extremely multi-ethnic countries. Fortunately, a very good technical paper in the Georgetown Journal of Asian Affairs attempts to do just that including crude birth rates and age structural analyses. [19]

Author Rachel Blomquist cites nationalist Buddhist politicians who clearly believe the Rohingya minority was outbreeding Buddhist natives on their "own" land, creating strife and conflicts over resources such that they should be expelled to their alleged homelands in Bangladesh. Such beliefs are common in ethnic conflicts, and matter whether they are based on reality or not. On pages 95 and 96, she writes: "*In Myanmar, the majority Buddhist population perceives the Muslim minority as a security threat based on differentials in population growth. Particularly acute in Rakhine State, where the Rohingya occupy approximately thirty percent of the total population, nationalists and locals alike support claims that high fertility and rapid population growth rates threaten to overwhelm local Buddhist communities."* Such fears highlight a common relationship between ethnicity, demography, resource stress and conflicts.

We have contended here that high birth rates are particularly significant. Blomquist records the crude birth rate for Rohingya here was about 27 (per thousand per year). Translation to growth rates is not automatic, but this implies growth rates of nearly 2% per year, and pyramidal age distributions with low median ages, and very high population pressures.

Conclusions

We have presented an arithmetic syllogism that suggests that in "complete equilibrium populations" birth rates will determine life expectancy. There could be high birth rate, high death rate equilibria, or low birth rate, low death rate equilibria, but there is no such thing as a high birth rate, low death rate equilibrium. That condition requires growth, which eventually runs into physical limits. Typical developed country birth rates like 12 (per thousand per year) would yield life expectancies of ~ 83 years (when all equilibria apply and the population neither grows, shrinks, nor emigrates, and age structures have stabilized). Birth rates of 25/1000/year, more typical of the Middle East or Northern Africa would stabilize at life expectancies of 40 years.

Most people prefer longer life expectancies, so migration flows along opportunity gradients and tend to go from high birth rate, low quality of life areas toward greater opportunities in less violent, lower birth rate areas. This is actually a story as old as civilizations on Earth. But aggregate population pressures have grown so great that the living system that sustains us all is now in great distress, and thermonuclear war is being discussed again. Time to act is not infinite.

This is theory. The real world examples sketched so simply show that leadership in both pre-World War II Japan and Germany were both motivated by desires for fresh resources and *Lebensraum*. Native Americans were almost wiped out in North America, and were sorely subjugated in South America, by waves of immigrants from the Old World. Easter Island is a case of isolation, where extensive emigration or immigration was impossible. That culture destroyed itself almost completely. El Salvador endured brutal civil war, then endemic violence

sufficient to repel about 20% of the population to other countries, whose remittances provide a fifth of El Salvador's current GDP. Syria destroyed itself less completely than Easter Island, but fully 1/4th of its population fled the chaos of Syria, and 1/3rd were internally displaced while at least half a million died violently. The Rohingya case is still unfolding, but they are being driven out of Myanmar relentlessly, despite UN resolutions and international laws against ethnic cleansing and genocide. [20]

Of course, there are also some very positive developments contrary to these negative examples. Birth rates in both Mexico and Iran declined dramatically, for example, in just a few decades despite strong resistance from organized and dominant religions that preferred ancient formulae for family planning and morality. China imposed its "One Child" policy, at very great costs culturally and of individual liberties, but pulled itself from periodic famine to become the fastest growing economy on the earth. Cultures tend to change very slowly unless catastrophe beckons. [21] Jared Diamond adds the dark observation that elites often choose to ignore signs of impending doom when corrective actions could be taken, because life is so comfortable for elites that pleas for help from the dispossessed are dismissed until it is too late. [22]

Everything born, dies eventually. That factor alone ensures that in the long run birth rates must equal death rates. Since death rates determine life expectancy directly, this implies that birth rates ultimately determine life expectancy, and therefore quality of life examined globally.

Some people will endure incredible hardships without resorting to violence, but some others often choose to fight over scarce resources to save their families. Politicians and militant forms of organized religions provide many ideological reasons (a.k.a. rationalizations) for organized violence (a.k.a. wars, genocides and ethnic "cleansing"). If humanity desires to avoid endless and eventually thermonuclear wars, it should rethink this ancient paradigm.

Intelligence professionals should consider the implications for conflict early warning, and plans for dealing with failed states that can succeed rather than committing our country to endless wars without addressing root causes. For example, the Rohingya in Myanmar practice a rarely extreme form of Islam that views education for girls as immoral, and encourages marriage for girls in their early teens, and childbirth as early and often as possible. This guarantees conflict with neighbors, which no amount of military intervention or humanitarian assistance can solve in the long run unless the Rohingya themselves reconsider these aspects of their culture. [23]

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[1] Flynn, Lt. Gen. Michael T., "How about Winning Our Nation's Wars Instead of Just Participating in Them?" in Military Review, March-April, 2016, pp 8-15.

[2] MG Michael T. Flynn, USA, Captain Matt Pottinger, USMC, and Paul D. Batchelor, DIA, "Fixing Intel: A Blueprint for Making Intelligence Relevant in Afghanistan," in Voices from the Field, Center for a New American Century, 2010, accessible at: https://www.cnas.org/publications/reports/fixing-intel-a-blueprint-for-making-intelligence-relevant .

[3] On the Causes of War, Michael Andregg, St. Paul, MN: Ground Zero Minnesota, 1997, 1999, 2001, 2007.

[4] Cincotta, R. "How Democracies Grow Up: Countries with too many Young People may not have a Fighting Chance for Freedom," in Foreign Policy, 165, 80-82, 2008. Also note: Cincotta, Richard, "Demography as early warning: Guaging future political transitions in the age-structural time domain," in Journal of Intelligence Analysis, 22(2): 129-148, Special issue on Early Warning, R. Fahlmann (Ed.), 2015.

[5] The most dramatic example of technology induced increases in carrying capacity is the "Green Revolution" started by Nobel Prize winning agronomist Norman Borlaug, although development of penicillin and other antibiotics could compete for that award. Late in life Borlaug admitted that despite such stunning advances in agricultural production, humankind could not outrun population pressure without restraint of birth rates.

[6] "Turn of the Century: Minnesota's Population in 1900 and Today", a publication of the MN Planning State Demographic Center, editor Martha McMurray, especially page 7, November, 1999.

[7] The term "Native American" is relatively recent, while the term "Indian" was predominant during that period, unless a specific tribe was identified. These terms have political connotations now that are irrelevant to this paper. Therefore, we use them interchangeably without any political inference intended.

[8] The "Mankato Uprising" of 1862, sometimes called the "US-Dakota War," was a key moment in this transition. Highly simplified, near starving Native Americans (Dakota and Lakota) who had been confined to reservations and denied promised food decided to fight, killing about 400 largely unarmed white settlers in the first days. That naturally aroused the US Army (and thousands of white citizens) who promptly slaughtered Indians who were fighting and drove thousands of them into Canada and the Dakota territories. About 1600 were confined to an 'internment' camp beneath Fort Snelling, where about 300 died during the brutal winter. Survivors were then shipped by steamboat to reservations further west, and Governor Alexander Ramsey put a bounty on the heads of others killed in the new state of Minnesota ($25 for ordinary Indians, to $500 for Chief Little Crow). The largest execution in US history occurred in Mankato, where 38 convicted of fighting were hung on December 26, 1862.

[9] I base these claims on personal conversations with very good professors with professional reputations in the study of causes of wars who shall remain unnamed. Most are friends who have helped me to learn about that.

[10] See Table in "Demographics of Japan" in Wikipedia, https://en.wikipedia.org/wiki/Demography_of_Japan .

[11] "Lebensraum" entry in the Holocaust Encyclopedia, maintained by the United States Holocaust Memorial Museum, accessed at: https://www.ushmm.org/wlc/en/article.php?ModuleId=10008219

[12] "Ultimate" causes of wars are much harder to pin down than triggering events. For one example, everyone knows that World War I began with the murder of Austrian Archduke Franz Ferdinand in Sarajevo, but theories about the ultimate causes of that war continue to evolve. Likewise, one could easily call the hubris of Hitler an ultimate cause of World War II. Who could know for sure if hubris was more important, or less, than his desire for "*Lebensraum*?"

[13] The Easter Island entry at history.com is at: http://www.history.com/topics/easter-island

[14] Data from the CIA's World Factbooks, 1968 and 2017, at https://www.cia.gov/library/publications/the-world-factbook/geos/es.html .

[15] The CIA's World Factbook, published by their Institute for the Study of Intelligence, is one good source for such numbers, and the other is the UN Demographic Yearbook. I tend to use the Factbook simply because it covers more variables, comes out every year and is easier to access, while the Demographic Yearbook is biannual and somewhat more narrowly focused. The World Bank also publishes systematic demographic data.

[16] The shorthand formula for doubling times is 70/growth rate in %, and the accurate formula is natural log of 2 divided by the growth rate. It is exactly the same for compound interest on investments as for population growth.

[17] "A Syrian Refugee at COP21, by Andrea Liverani, 21 October, 2015, accessible at: http://blogs.worldbank.org/peoplemove/syrian-refugee-cop21

[18] *UNHCR Syria Regional Refugee Response/Total Persons of Concern". UN High Commissioner for Refugees, 29 August 2015.*

[19] "Ethno-Demographic Dynamics of the Rohingya-Buddhist Conflict" by Rachel Blomquist, Georgetown Journal of Asian Affairs, Fall, 2016, pp: 94-117. This is accessible at: https://asianstudies.georgetown.edu/sites/asianstudies/files/documents/gjaa_3.1_blomquist_0.pdf

[20] Blomquist, Rachel and Richard Cincotta, "Myanmar's Democratic Deficit: Demography and the Rohingya Dilemma" in New Security Beat, Wilson Center's Environmental Change and Security Program, April 12, 2016, at: https://www.newsecuritybeat.org/2016/04/myanmars-democratic-deficit-demography-rohingya-dilemma/ .
[21] Tainter, Joseph A. (ed.), The Collapse of Complex Societies, London: Cambridge University Press, 1988.
[22] Diamond, Jared, Collapse: How Societies Choose to Fail or Succeed, New York, NY: Viking Penguin, 2005.
[23] PBS Newshour, "Why this 13 year-old Rohingya refugee faces intense pressure to marry," April 25, 2018, accessible at: https://www.pbs.org/newshour/show/pbs-newshour-full-episode-april-25-2018 .